An Embedded IoT System for Pig Farm Management

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***Abstract*—This thesis studies an embedded Internet of Things system for managing a pig farm. The report describes a Raspberry Pi controller, environmental sensing, relays, servo control, Python code, and a Firebase connection. Its appendix includes code for reading a DHT11 sensor and receiving scheduled control events. The conclusion discusses possible benefits of collecting environmental data, remote access, and automation, as well as future security and expansion work. Those benefits are presented as design potential; the source does not report a measured farm trial, animal-health outcome, or verified production gain. The contribution is a documented educational prototype and a set of technical components for later evaluation under real farm conditions.**

***Index Terms*—pig farm, embedded IoT, Raspberry Pi, DHT11, Firebase**

I. Introduction

Pig farming can require routine observation of environmental conditions and repeated equipment control. This thesis examines whether an embedded IoT architecture can help organize those tasks. It introduces Raspberry Pi and connected sensors as a basis for remote monitoring and control. The report focuses on construction and demonstration of technical components. It does not establish how a particular farm performed before the project or specify a production deployment [1]. Earlier ICTU student work on related designs is included here for context [2], [3], [4], [5]. Related published studies provide context for the subject and methods [6], [7], [8], [9], [10]. These contextual works were selected for this English summary; they are not asserted to appear in the original thesis bibliography.

II. Methods

The author reviews embedded systems and IoT, selects a Raspberry Pi and sensors, and documents wiring and Python control logic. The source appendix shows DHT11 readings, relay and servo outputs, button input, and Firebase-related scheduling code. The implementation is described through diagrams, code, and example interfaces. The report does not specify a controlled animal-care experiment, continuous farm monitoring period, or independent security test [1].

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III. Results

The manuscript presents a Raspberry Pi based design and code for sensor reading and actuator control. It documents the intended path from environmental observations to relays, servo actions, and remote scheduling. The conclusion describes data collection and remote management as useful capabilities. No measured production effect, change in farm labor, or animal-health improvement is reported. The evidence supports the prototype design and documented software components [1].

IV. Discussion

The architecture may make farm conditions easier to inspect, but reliable field operation would depend on sensor calibration, power, network availability, and safe actuator behavior. The author proposes additional sensors, production analysis, security improvements, and integration with other systems. These are future directions, not completed outcomes. A real farm trial should record environmental accuracy, failures, response time, and maintenance needs before asserting operational benefits [1].

V. Conclusion

The thesis documents an embedded IoT pig-farm prototype using Raspberry Pi, sensors, control outputs, Python, and Firebase-related code. The source supports the design and implementation material, while its broader efficiency claims remain prospective. It does not provide a quantified farm trial or validated animal-care result. The work can guide later integration and testing, with security and reliability requiring explicit evaluation [1].

References

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